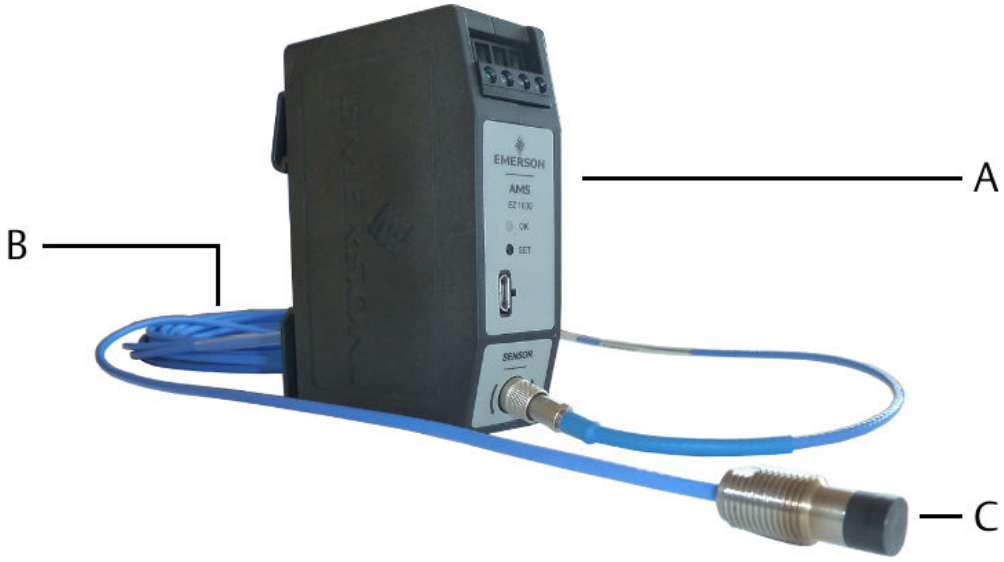
Which sensor type is applicable for a measuring application depends on several requirements such as desired measuring range, available measuring track, and maximum environmental temperature. Each AMS EZ 1000 Sensor requires an AMS EZ 1000 Converter to complete the measuring chain. Use the EZ190x-xxx extension cable to adjust the sensor cable length to the installation requirements.

Note
Ensure that the overall cable length, sensor cable plus extension cable, is at least 4 meters and does not exceed 10 meters.

3.2 The measuring chain

An AMS EZ 1000 Sensor, together with the AMS EZ 1000 Converter, form the eddy current measuring chain. Use this measuring chain for contactless distance, vibration, or speed measurements. Different types of sensors and the software-configurable AMS EZ 1000 Converter allow an optimal adaption to the requirements of the machine to be monitored.

Figure 3-2: Eddy current measuring chain



A. AMS EZ 1000 Converter
B. EZ190x-xxx extension cable (optional)
C. AMS EZ 1000 Sensor

To achieve a high accuracy, the parts of the measuring chain, the sensor, the sensor cable (sensor cable plus optional extension cable), and the converter, are calibrated together. See the AMS EZ 1000 Converter operating manual for the calibration details.

The characteristics of the measuring chain also depend on the material of the measuring object (target), for example, the machine shaft material. The material mainly used for turbo machinery is 42CrMo4. During the calibration process, the measuring chain is adapted to the material.

Ensure that the threads are clean and smooth-running.

Do not bend or twist the sensor cable. If the sensor cable has an adapter plug, open it.

To avoid touching the shaft during installation, the maximum distance between measuring target and sensor tip must be adjusted first. Screw in the sensor until the converter output voltage starts changing (approximately at -20V DC). Close the adapter plug for measuring the converter output voltage.

2. Adjust the distance between measuring target and sensor tip according to the measuring task.

   Use a voltmeter connected to the converter output to measure the output voltage. Open the adapter plug at every two turns of the sensor to untwist the cable.

   Ensure that in the direction of the sensor tip, at least the always unthreaded part of the sensor case (length EZ105x-xx-xx-xxx: 5.0 mm, length EZ108x-xx-xx-xxx: 5.0 mm, length EZ116x-xx-xx-xxx: 6.0 mm) remains free.

3. Secure the sensor by fixing the nuts.

   The maximum tightening torque for fixing the nuts is:

   - EZ105x-xx-xx-xxx: 1 Nm
   - EZ108x-xx-xx-xxx: 15 Nm
   - EZ116x-xx-xx-xxx: 98 Nm

4.2.1 Requirements and hints for the sensor mounting

This section contains information and installation requirements for the sensor. The final adjustment of the sensor depends on the measuring task and requires a complete measuring chain. The AMS EZ 1000 Converter manual and the manuals for the evaluation electronics, such as the AMS 6500 ATG system, contain detailed information regarding the final adjustment.

General holder requirement

To mount the sensor, use a stiff and vibration-free holder with a mounting thread for the selected sensor.

General distance adjustment

For distance adjustment, the complete measuring chain consisting of sensor and converter is required as the distance will be generally adjusted by means of the converter output voltage.

Sensor fastening

- Use the enclosed nuts when installing sensors.
- Lock nuts to avoid loosening of the sensor. Loose parts can fall into the machine and cause damage. A medium-grade, removable, screw-securing adhesive (for example: Loctite® 242, blue) is recommended to secure the sensor.

Table 4-5: Minimum lateral distance *(continued)*

Sensor type	Extended range factor[1]	Minimum distance	Additional linearity error
	1.5	>7 mm	<1%
	2.0	>10 mm	<1%
EZ105x-xx-xx-xxx	1.0	>5 mm	<1%
	1.5	>5 mm	<5%
	2.0	>5 mm	<5%

1 *See Operating manual AMS EZ 1000 Converter (MHM-97884).*

4.3 Wiring hints

This section contains general information and wiring hints regarding the sensor cable installation. As always, proper cable installation depends on observations and judgments based on the situation on-site. Observe the following points for a reliable cable installation:

- Do not bend or twist the sensor cables. Cables and connectors must be movable when the sensor is screwed into the holder.
- Install the cable strain-free and spin-free such that it is protected against mechanical damages.
- Do not shorten the sensor cable or the extension cable. Roll up the excess cable (rolling diameter ≥100 mm).
- Ensure that no parts of the cable, including the adapter plug, touch any rotating parts of the machine.
- Note that machines can expand or shrink due to temperature influences. Always install the sensor cable with a cable length reserve to compensate the thermal behavior of the machine.
- Only install cables with a minimum bending radius of 25 mm. For sensor cables with metal protection tubes, the minimum bending radius is 35 mm.
- Avoid oil stream areas for sensor cableways. Be sure that no oil stream or other agitations will permanently move the cable.
- Avoid sensor cableways where the cable is permanently submerged in oil.
- Affix the sensor cable at recurring short distances.
- Do not squeeze the cable, for example, between metal plates for fixing. Squeezing the cable will damage the outer isolation, which could allow oil into the cable or causes short-circuits.
- Lead the sensor cable through the bearing pedestal wall (machine case), below the horizontal joint of the machine and above the residual oil level in the bearing pedestal. Do not lead the sensor cable through the upper or removable pedestal cover. This could cause problems during machine maintenance, and represents a safety concern.

5 Technical data

Only specifications with tolerances are guaranteed. Data without tolerance or without error limits are informative data and not guaranteed. Technology is under constant development, and specifications are subject to change without notice.

All specifications are valid for a measuring chain consisting of a sensor EZ105x-xx-xx-xxx, EZ108x-xx-xx-xxx, EZ116x-xx-xx-xxx and an AMS EZ 1000 Converter calibrated to the sensor.

5.1 Measuring targets

		EZ105x-...	EZ108x-...	EZ116x-...
Measuring target		shafts and plain surfaces		
Shaft diameter	Minimum	15 mm	20 mm	--- mm
	Recommended	>20 mm	>25 mm	---
Speed of shaft circumference		0 to 2500 m/s		
Object material		electrical conducting materials		
Reference material		1.7224 (42CrMo4; AISI/SAE 4140)		
Target material		P235S C35 (AISI/SAE 1035) 34CrMo4 (AISI/SAE 4337, 4340) 26NiCrMoV14 ST 37, S235JR X35CrMo17 CK1500590 ASTM A276 Type 410 30CrNiMo8 18CrNiMo7-6 Other (On Request)		

5.2 Measuring ranges and sensitivity

The data in this chapter is valid for standard measuring ranges (extended range factor: **1.0**).

Sensor	EZ105x-...	EZ108x-...	EZ116x-...
Nominal measuring range, static measurements	±0.5 mm	±1.0 mm	±2.0 mm
Nominal measuring range, dynamic, peak – peak (recommended)	≤625 µm	≤1250 µm 2000 µm[1]	≤2500 µm

Sensor	EZ105x-...	EZ108x-...	EZ116x-...
Sensitivity for 42CrMo4	16 V/mm (ISO) 15.74 V/mm (API)	8 V/mm (ISO) 7.87 V/mm (API)	4 V/mm (ISO) 3.935 V/mm (API)
Value for nominal distance at the center point of converter output signal	0.75 mm	1.5 mm	2.7 mm
Initial air gap	0.25 mm	0.5 mm	0.7 mm

1 Standard measuring chain according to API 670 consisting of EZ108x-xx-xx-010, EZ190x-040, and AMS EZ 1000 Converter with standard target material 42CrMo4.

5.3 Environmental conditions

	EZ105x and EZ108x	EZ116x
Reference temperature	+23°C	
Temperature nominal operating range	-35°C to +180°C (sensor inclusive 1 m cable)	-35°C to +150°C (sensor inclusive 1 m cable)
Temperature nominal range for cable and connector	-35°C to +150°C	
Temperature limits for storage and transport	−40°C to +70°C	
Temperature error (according to API 670, only sensor)	4 % per 100 K	
Humidity	5 to 95%, non condensing Additional linearity error of ±0.2% for EZ105x-xx-xx-xxx and EZ108x-xx-xx-xxx with 5 meter sensor cable and standard measuring range at 10 to 100 % relative humidity (rh), condensing.	
Resistance to chemicals (at room temperature)	Sensor and cable are resistant to: water, steam, natural gas, helium, bearing oils, gasoline, benzol, nitric acid, tetra carbon chloride, tetra chloride ethylene.	
Pressure resistance to sensor tip	Typical 2000 hPa **Note** Sensors are not pressure and leakage tested prior to shipment. **⚠ CAUTION** If using AMS EZ 1000 Sensors in applications require a sealing against leakage ensure that the sensor temperature does not exceed 120°C to avoid damages to the internal sensor sealing.	

	EZ105x and EZ108x	EZ116x
Pressure and differential pressure resistance at cable outlet	Pressure test certificate for up to 10000 hPa on request	
maximal Vibration	5g at 60 Hz	
Dimensions	See Drawings	
	Diameter connector cap nut (sensor cable and extension cable): 8.3 mm	
Material	Sensor tip: GF30 (glass-fiber reinforced PEEK Polyether Ether Ketone)	Sensor tip: Epoxy resin
	Case: Stainless Steel	
	Cable: FEP Flourinated Ethylene Propylene	
	Connector: Brass, nickel-plated	
Metal protection tube (EZ1051-xx-xx-xxx, EZ1053-xx-xx-xxx, EZ1081-xx-xx-xxx, EZ1083-xx-xx-xxx, EZ1161-xx-xx-xxx, and EZ1163-xx-xx-xxx)	Stainless steel	
Weight (sensor with 1 m cable, no metal protection tube)	Approximately 100 g	Approximately 200 g

7 Order information

The EZ105x-xx-xx-xxx, EZ108x-xx-xx-xxx, and EZ116x-xx-xx-xxx sensors can be ordered in different variations according to Table 7-1 and Table 7-2, Table 7-3 and Table 7-4. Use the EZ190x-xxx extension cable to adjust the cable length to your needs (see Table 7-5).

Note
Ensure that the overall cable length, sensor cable plus extension cable, is at least 4 meters and does not exceed 10 meters.

Table 7-1: Ordering information – Sensor

Tip diameter	Case thread	Armored cable	Model No.
5 mm	M8x1	No	EZ1050
		Yes	EZ1051
8 mm	M10x1	No	EZ1080
		Yes	EZ1081
16 mm	M18x1.5	No	EZ1160
		Yes	EZ1161
5 mm	1/4"-28 UNF	No	EZ1052
		Yes	EZ1053
8 mm	3/8"-24 UNF	No	EZ1082
		Yes	EZ1083
16 mm	3/4-16UNF	No	EZ1162
		Yes	EZ1163

Table 7-2: Ordering matrix – EZ105x

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1050 EZ1051	-	**02**[3] 20 mm (Minimum) to **10** 100 mm (Maximum) Order in increments of 10 mm.	-	**00** 0 mm (no unthreaded length) **05** 50 mm[4]	-	**005** 0.5 m **010** 1.0 m **015** 1.5 m **020** 2.0 m **030** 3.0 m **050** 5.0 m **100** 10.0 m **150**[5] 15.0 m

Table 7-2: Ordering matrix – EZ105x *(continued)*

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1052 EZ1053	-	**08**[6] 0.8 in **10** 1.0 in (Minimum) to **40** 4.0 in (Maximum) Order in increments of 0.5 in.	-	**00** 0 in (no unthreaded length) **20** 2.0 in[7]	-	

1 *The usage of EZ190x-xxx Extension Cable is possible with options 0.5 m, 1.0 m, 1.5 m, and 2.0 m.*
2 *When using sensors in combination with extension cables, the overall system length must be 4.0 m, 5.0 m, 6.0 m, 7.0 m, 8.0 m, 9.0 m, or 10.0 m.*
3 *The 20 mm case is only available with EZ1050.*
4 *The remaining threaded length must be either 50 mm or 100 mm.*
5 *On request (non-standard)*
6 *The 0.8 in case is only available with EZ1052.*
7 *The remaining threaded length must be either 2.0 in or 4.0 in.*

Example:

EZ1050-04-00-050

EZ 5 mm, M8x1, No armor, 40 mm sleeve, 0 mm unthreaded, 5 m cable

Table 7-3: Ordering matrix – EZ108x

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1080 EZ1081	-	**02**[3] 20 mm (Minimum) to **25** 250 mm (Maximum) Order in increments of 10 mm. **RM** Reverse Mount	-	**00** 0 mm (no unthreaded length) **05** 50 mm (Minimum) to **20** 200 mm (Maximum[4])	-	**005** 0.5 m **010** 1.0 m **015** 1.5 m **020** 2.0 m **030** 3.0 m **050** 5.0 m **100** 10.0 m **150**[5] 15.0 m **300**[5] 30.0 m

Table 7-3: Ordering matrix – EZ108x *(continued)*

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1082 EZ1083	-	**08**[6] 0.8 in **10** 1.0 in (Minimum) to **95** 9.5 in (Maximum) Order in increments of 0.5 in. **RM** Reverse Mount	-	**00** 0 in (no unthreaded length) **20** 2.0 in (Minimum) to **75** 7.5 in (Maximum[7])	-	

1 *The usage of EZ190x-xxx Extension Cable is possible with options 0.5 m, 1.0 m, 1.5 m, and 2.0 m.*
2 *When using sensors in combination with extension cables, the overall system length must be 4.0 m, 5.0 m, 6.0 m, 7.0 m, 8.0 m, 9.0 m, or 10.0 m.*
3 *The 20 mm case is only available with EZ1080.*
4 *The remaining threaded length must be either 50 mm or 100 mm.*
5 *On request (non-standard)*
6 *The 0.8 in case is only available with EZ1082.*
7 *The remaining threaded length must be either 2.0 in or 4.0 in.*

Example:

EZ1080-02-00-050

EZ 8 mm, M10x1, No armor, 20 mm sleeve, 0 mm unthreaded, 5 m cable

Table 7-4: Ordering matrix – EZ116x

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1160 EZ1161	-	**04** 40 mm (Minimum) to **29** 290 mm (Maximum) Order in increments of 10 mm.[3]	-	**00** 0 mm (no unthreaded length)[4] **05** 50 mm (Minimum) to **24** 240 mm (Maximum[5])	-	**010** 1.0 m **050** 5.0 m **100** 10.0 m
EZ1162	-	**15** 1.5 in (Minimum) to **95** 9.5 in (Maximum) Order in increments of 0.5 in. 6	-	**00** 0 in (no unthreaded length) [4] **20** 2.0 in (Minimum) to **75** 7.5 in (Maximum[7])	-	

Table 7-4: Ordering matrix – EZ116x *(continued)*

Model No.	-	Case length XX	-	Unthreaded length XX	-	Cable length XXX[1,2]
EZ1163						

1 *The usage of EZ190x-xxx Extension Cable is possible with option 1.0 m.*
2 *When using sensors in combination with extension cables, the overall system length must be 4.0 m, 5.0 m, 6.0 m, 7.0 m, 8.0 m, 9.0 m, or 10.0 m.*
3 *Standard: **04** to **10**, **15**, **20**, **25**, and **29**; all other case lengths on request*
4 *Standard, all other unthreaded lengths on request*
5 *The remaining threaded length must be either 50 mm or 100 mm.*
6 *Standard: **15** to **40**, **60**, **80**, and **95**; all other case lengths on request*
7 *The remaining threaded length must be either 2.0 in or 4.0 in.*

Example:

EZ1160-05-00-050

EZ 16 mm, M18x1.5, No armor, 50 mm sleeve, 0 mm unthreaded, 5 m cable

Table 7-5: Ordering matrix – Extension cable

Sensor cable	Armored cable X	-	Cable length XXX
EZ190	**0** No	-	**020** 2.0 m **025** 2.5 m **030** 3.0 m **035** 3.5 m **040** 4.0 m **045** 4.5 m **050** 5.0 m **055** 5.5 m **060** 6.0 m **065** 6.5 m **070** 7.0 m **075** 7.5 m **080** 8.0 m **085** 8.5 m **090** 9.0 m **095** 9.5 m **140** 14.0 m[1] **290** 29.0 m[1]
EZ190	**1** Yes		

1 *On request (non-standard), 30.0 m not available with EZ 105x sensors.*

Example:

EZ1900-040

EZ190 extension cable, no armor, 4 m cable